

SOV/70-4-1-12/26

AUTHORS: Konstantinova, V.P., Sil'vestrova, I.M. and  
Aleksandrov, K.S.

TITLE: The Growth of Crystals of Triglycine Sulphate and Their  
Physical Properties (Polucheniye kristallov triglitsin-  
sulfata i ikh fizicheskiye svoystva)

PERIODICAL: Kristallografiya, 1959, Vol 4, Nr 1, pp 69-73 (USSR)

ABSTRACT: A new ferroelectric, triglycine sulphate  $(\text{NH}_2\text{CH}_2\text{COOH})_3\text{H}_2\text{SO}_4$   
was synthesised by adding 50%  $\text{H}_2\text{SO}_4$  to a boiling solution  
of technical quality glycine,  $\text{NH}_2\text{CH}_2\text{COOH}$ . Small crystals  
were obtained on cooling and two recrystallisations gave  
materials sufficiently pure for growing large crystals  
which were obtained by cooling a saturated solution over  
10 hours from 52 to 25 °C at a rate automatically con-  
trolled to give a constant supersaturation. This sufficed  
to grow crystals of 360 g weight. The measured density  
was 1.68 g/cm<sup>3</sup>. For physical measurements axes were  
designated as follows: the crystals belong to Class 2 with  
 $\beta \sim 105^\circ$ , Y is the polar axis, Z the direction parallel

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The Growing of Crystals of Triglycine Sulphate and Their Physical Properties

to the natural face of the crystal and X makes an angle of  $15^{\circ}$  with the c-face. The Curie point is about  $49.2 - 49.3^{\circ}\text{C}$ , the ferroelectric axis being in the 2 direction. Dielectric constants were measured with a Q-meter at 500 kc/s on a crystal plate oriented to  $\pm 1^{\circ}$ . The values:

$$\begin{aligned}\epsilon_{11} &= 8.6 & \epsilon_{33} &= 5.7 \\ \epsilon_{22} &= 43 & \epsilon_{13} &= 0.53\end{aligned}$$

were found, the dependence on frequency of  $\epsilon_{22}$  from 200 c.p.s. to 10 kc/s at 1, 5 and 10 V/cm being given. The piezoelectric moduli were found to be:

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$$\begin{aligned} d_{21} &= 70.7 \pm 0.1 \times 10^{-8} \text{ c.g.s.u.} & d_{14} &= +8.3 \pm 0.1 \times 10^{-8} \text{ c.g.s.u.} \\ d_{22} &= 23.8 \pm 0.5 & d_{36} &= 8.5 \pm 0.1 \\ d_{23} &= 76.0 \pm 0.1 & d_{34} &= -9.6 \pm 0.5 \\ d_{25} &= 73.0 \pm 0.3 & d_{16} &= -13.7 \pm 0.2 \end{aligned}$$

There were considerable differences from specimen to specimen amounting, for Y-cut crystals, to 15-20%. The elastic moduli were found by an ultrasonic pulse method from a set of six plates with an accuracy of 1-2%. They are:

$$\begin{aligned} c_{11} &= 4.55 \times 10^{11} \text{ dynes/cm}^2 & c_{31} &= 1.98 \\ c_{22} &= 3.21 & c_{12} &= 1.72 \\ c_{33} &= 2.63 & c_{15} &= -0.30 \\ c_{44} &= 0.95 & c_{25} &= -0.036 \\ c_{55} &= 1.11 & c_{35} &= -0.5 \end{aligned}$$

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The Growing of Crystals of Triglycine Sulphate and Their Physical Properties

$$c_{66} = 0.62$$

$$c_{46} = -0.026$$

$$c_{23} = 2.08$$

Acknowledgments are made to Academician A.V. Shubnikov and I.S. Zheluzov for their advice and to Ye.M. Akulenok for help with experiments.

There are 5 figures, 1 table and 6 references, 3 of which are Soviet, 1 English, 1 German and 1 international.

ASSOCIATION: Institut kristallografii AN SSSR (Institute of Crystallography of the Ac.Sc.USSR)

SUBMITTED: June 17, 1958

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SOV/70-4-1-25/26

AUTHORS: Konstantinova, V.P., Sil'vestrova, I.M. and Yurin, V.A.

TITLE: Twinning and the Dielectric Properties of a Crystal of Triglycine Sulphate (Dvoynikovaniye i dielektricheskiye svoystva kristalla triglitsinsul'fata)

PERIODICAL: Kristallografiya, 1959, Vol 4, Nr 1, pp 125-129 (USSR)

ABSTRACT: The Y-axis in  $(\text{NH}_2\text{CH}_2\text{COOH})_3\cdot\text{H}_2\text{SO}_4$  is the direction of ferroelectric polarisation and plates cut perpendicular to this axis were examined here. Etching these plates showed the twin structure with individuals from tenths of a millimetre to several centimetres. The faces at the two ends of the polar axis are etched differently, one kind of etching giving a matte effect and the axes of the individuals are parallel or anti-parallel to the plate normals. This observation is confirmed by the complementary patterns observed on two sides of the plate. The hysteresis loop (dielectric hysteresis) of the plate was studied between  $-80$  and  $+53^\circ\text{C}$ . The spontaneous polarisation at  $23^\circ\text{C}$  is  $2.02 \times 10^{-6}$  coul/cm<sup>2</sup>. The

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Twinning and the Dielectric Properties of a Crystal of Triglycine Sulphate

coercivity for most specimens lay between 200 and 300 V/cm, but some were <sup>from</sup> 90 to 1 000 V/cm. The dielectric constant was measured at various frequencies, temperatures and field strengths;  $\epsilon_{22}$  shows a sharp dielectric anomaly ( $\lambda$ -point) at 49.2-49.6 °C and  $\epsilon_{11}$  also shows a small peak at this temperature but  $\epsilon_{33}$  does not. The spontaneous polarisation falls to zero at about 52 °C. Acknowledgments are made to Academician A.V. Shubnikov and I.S. Zheludev for their advice. There are 9 figures and 1 English reference.

ASSOCIATION: Institut kristallografii AN SSSR (Institute of Crystallography of the Ac.Sc., USSR)

SUBMITTED: June 17, 1958

Card 2/2

PHASE : BOOK EXPLOITATION

Восстановлена А.Р.Ференс, с. 22, 1953

Vienna disintegrators, truly strong vacuum pumps, etc. (Physics of Dielectrics)  
Transactions of the 2d All-Union Conference on the Physics of Dielectrics  
Moscow, February 25-26, 1960. 524 p. Russian slip inserted, 5,000 copies  
printed.

Generating Agency: *Adelphi and SGR, Pittsburgh Institute for P.S. Research*  
 Md. of Publishing Firm: *Ed. Gerald Sherry, Inc. Ed. J. M. DeLatta, Ed.*  
 Internal Agent: *Asst. Ed. G. J. Gannett, Director of Public and Professional*  
*Deceased, and Ed. Philip, Committee of Public and Professional*  
 Remarks: *This collection of reports is intended for scientists interested*  
*in the study of delinquents.*

[illegible]

Sociology, G.A. A. Aramyan, V.A. Isakov, and S.B. Polyanin  
Periodic Reports of Complex Competition Institute of Sociologists,  
AS USSR]

**Jeffrey J. Leach**—Geometric Model for the Description of Polymorphic Phase Transitions in Crystals [Physics Division, Newsw State University Iseal, N.Y. Iseal] 36

Kozlovskaya, V. P., L. M. Shlyegter and E. J. Labadzev. Growth Structure and Certain Physical Properties of Polycrystalline Sulfate Crystals  
[Institute of Crystallography, Academy of Sciences U.S.S.R., Moscow]

Schulz<sup>1,2</sup>, and Taylor<sup>1,3</sup>. See Crystallographical Problems of Ferroelectric Crystals with a Herring Bone Institute of Crystallography, Academy of Sciences, Moscow, 36

Reichle, R. H., and J. J. Smith, Jr. Effect of Various  
Oxides on the Electrical Properties of Barium Alkalate  
372

Chemistry, B.S., Electrical Properties of the Solid - Condensed System  
[Department: Faculty of Science; University: Department of State University -  
by)]

[illegible]

404 **Singh, Patel, and Oja, Temperature Effect of Small Addition Acids on the Electrical Properties of Polyethylene Resins (continued from page 349)**

<sup>1</sup> R. L. A. and V. A. "Physical Properties of the Conductors Between Electric Conductors of Ferroelectric Crystals and Ferroelectric Layers," *Journal of Applied Physics*, 1970, 41, 10, 3910-3915.

Card 1 of 1

24.7000

78116  
SOV/70-5-1-25/30

AUTHORS: Sil'yestrov, I. M., Romanov, N. A.

TITLE: Effect of the Exposure of Triglycine Sulfate Crystals to Ultraviolet Radiation on Their Ferroelectric Properties. Brief Communications

PERIODICAL: Kristallografiya, 1960, Vol 5, Nr 1, pp 147-150 (USSR)

ABSTRACT: Radiation damage effect in Rochelle salt and triglycine sulfate has been known. The authors furthered the studies. Triglycine sulfate plates, 0.5 to 3.5 mm thick, parallel to the cleavage running normal to the polar axis, became dull and yellow after 20- to 30-hr exposure to ultraviolet radiation emitted from quartz-mercury lamps DRSh-100 and SVDSH-250. The hysteresis loops became distorted as shown in Fig. 1. The experiments revealed that absorption in 2-mm-thick plates decreases from nearly complete for short-wave ultraviolet rays to 57% at  $\lambda = 250 \text{ m}\mu$  and to 40% for violet rays with

Cont 1/1



Effect of the Exposure of Triglycine Sulfate  
Crystals to Ultraviolet Radiation on Their  
Piezoelectric Properties. Brief Communications

78116

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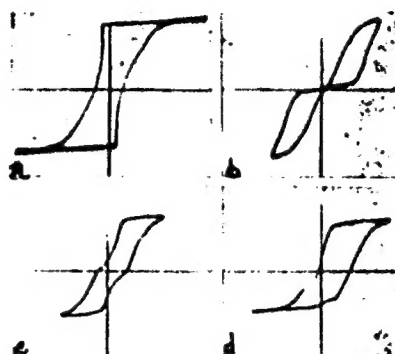


Fig. 1. Distortion of hysteresis loop in triglycine sulfate due to exposure to ultraviolet radiation: (a) unexposed specimen; (b, c, d) exposed specimens: (b) hysteresis loop on weak fields, (c, d) on a saturated fields.

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Effect of the Exposure of Triglycine Sulfate Crystals to Ultraviolet Radiation on Their Ferroelectric Properties. Brief Communications 7-1116  
 307/70-0-1-25/30

$\lambda = 400 \text{ m}\mu$ . Short-wave rays with  $\lambda = 250 \text{ m}\mu$  proved to affect the ferroelectric properties of triglycine sulfate to a greater extent. The radiation effect was not confined to a surface layer as two different experiments verified. Ultraviolet radiation began to alter the hysteresis loop in about 45 seconds; further radiation did not affect spontaneous polarization but increased the coercive field and moved the hysteresis loop along X axis until a new stable state was achieved after 4 months of radiation. The new state remained stable even after annealing above the Curie point for 4 to 5 hr, or after keeping the specimen in a strong electric field. The exposure to ultraviolet radiation proved to decrease the dielectric susceptibility of triglycine sulfate from 47 to 30 at  $25^\circ \text{C}$ .  $1/\epsilon$  vs temperature curves (Fig. 5) point to the applicability of the Curie-Weiss law to both exposed and unexposed specimens

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Effect of the Exposure of Triglycine Sulfate Crystals to Ultraviolet Radiation on Their Piezoelectric Properties. Brief Communications 78116  
SOV/70-1-1-25/30

of triglycine sulfate. Exposure to radiation changes the slope of the  $\epsilon$  vs temperature curve and makes the plates less elastic. For instance,  $\epsilon$  decreases from  $37.16 \times 10^{-13}$  to  $34.95 \times 10^{-13}$  cm<sup>2</sup>/dyne. Piezoelectric modulus  $d_{23}$  decreases from  $62.5 \times 10^{-8}$  to  $46.7 \times 10^{-8}$  and  $39.2 \times 10^{-8}$  CGSE units after exposure to radiation for 12 and 24 hr respectively. The piezoelectric modulus of an exposed specimen increased, however, to  $95.5 \times 10^{-8}$  CGSE units again after application of direct electric field. I. S. Zheludev is acknowledged for advice, I. V. Gavrilova for specimens, and V. N. Varfolomeyeva for assistance. There are 5 figures; and 7 references, 5 Soviet, 1 Indian, 1 U.S. The U.S. reference is: A. G. Chynoweth, Phys. Rev., 113, 159-166 (1959).

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Effect of the Exposure of Triglycine Sulfate 76116  
Crystals to Ultraviolet Radiation on Their 307/70-5-1-25/30  
Ferroelectric Properties. Brief Communications

ASSOCIATION: Crystallographical Institute of the Academy of  
Sciences of the USSR (Institut kristallografi  
AN SSSR)

SUBMITTED: October 21, 1959

Card 5/6

Effect of the Exposure of Triglycine Sulfate  
Crystals to Ultraviolet Radiation on Their  
Ferroelectric Properties. Brief Communications

78110  
SOV/70-5-1-25/30

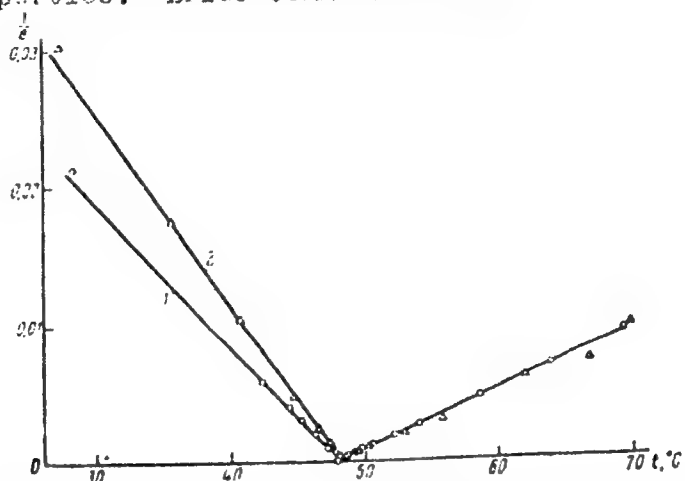


Fig. 5. Dependence of  $1/\epsilon$  on temperature for triglycine sulfate crystals: (1) unexposed specimen; (2) exposed specimen.

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9.2180

84999

S/048/60/024/010/008/033  
2013/E063

AUTHORS: Konstantinova, V. P., Sil'vestrova, I. M., Shuvalov, L.A.,  
and Yurin, V. A.

TITLE: Production and Piezoelectric Properties<sup>1</sup> of Crystals of  
Deuterized Triglycin Sulfate

PERIODICAL: Izvestiya Akademii nauk SSSR. Seriya fizicheskaya, 1960,  
Vol. 24, No. 10, pp. 1203-1205

TEXT: Monocrystals of deuterized triglycin sulfate (DTGS) were obtained from monocrystals of ordinary triglycin sulfate (TGS) dissolved in D<sub>2</sub>O. The solution was boiled, whereupon large DTGS monocrystals with a weight of up to 100 g were bred from it. The external form of the DTGS crystals is the same as in TGS crystals. In their symmetry they belong, like TGS crystals, to the monocline system. The form of the domain boundaries in DTGS crystals is shown in Fig. 1. Measurements have shown that the dependencies of all of the characteristics of reversion of polarization on temperature, on the field, on the frequency, and other quantities (Figs. 2-5) in DTGS crystals exhibit a qualitative similarity with the

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84999

Production and Piezoelectric Properties of Crystals of Deuterized Triglycin Sulfate S/048/60/024/010/008/033  
B013/B063

corresponding dependencies of TGS crystals. Fig. 6 illustrates the relations  $i_{\max}/S = f(E)$  and  $1/\tau_{\max} = f(E)$ , taken at different temperatures. (S - electrode area. E - field strength during the pulse). Fig. 7 gives the temperature dependence of mobility  $\mu$ , as calculated from formula

$$\mu = \frac{d}{\tau_{\max}(E - E_a)} \quad (d - \text{thickness of plate, } E_a - \text{activation field}).$$

Owing to the fact that DTGS crystals, compared with TGS crystals, are usable within a much wider temperature range, and that their characteristics at room temperature exhibit a lesser temperature dependence, they can be used in the same cases as the TGS crystals in spite of their considerable electrical hardness. The authors thank I. S. Zheludev for his discussion of results, and Ye. M. Akulenok, K. A. Pluzhnikov, and L. N. Kurnakovskaya for assistance given in the experiments. The present paper was read at the Third Conference on Piezoelectricity which took place in Moscow from January 25 to 30, 1960. There are 7 figures and 8 references: 5 Soviet.

ASSOCIATION: Institut kristallografii Akademii nauk SSSR  
(Institute of Crystallography of the Academy of Sciences  
USSR)

Card 2/2

9.5300

85001  
S/048/60/024/010/010/033  
B013/B063

AUTHOR: Sil'vestrova, I. M.

TITLE: The Problem of Light Receivers Based on the Pyroelectric Effect 

PERIODICAL: Izvestiya Akademii nauk SSSR. Seriya fizicheskaya, 1960, Vol. 24, No. 10, pp. 1213-1215

TEXT: This article deals with the possibility of using triglycin sulfate crystals as light receivers. For this purpose, the author chose a simple position for the crystal relative to the incident light (Fig. 1). The circuit diagram of the experimental arrangement is shown in Fig. 2. The measurement of the temperature dependence of the pyroelectric voltage is illustrated in Fig. 3. A marked increase of sensitivity of the receiver was found in the temperature range about 40°C. From 46 + 47° onward it decreases considerably. The effect of the d-c voltage on the course of the pyroelectric voltage at different temperatures is shown in Fig. 4. The effect of a constant field causing polarity reversal upon the pyroelectric voltage of the receiver at 20°C is shown in Fig. 5. The hysteresis dependence of the pyroelectric voltage on the magnitude of the field is clearly

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The Problem of Light Receivers Based  
on the Pyroelectric Effect

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S/048/60/024/010/010/033  
B013/B063

seen therefrom. The coercive field of the sample estimated from the measurements has a strength of  $400 \text{ v cm}^{-1}$ . This value agrees with the data from Ref. 4. The results obtained lead to the following conclusion: The crystal under consideration is a particularly suitable light receiver in the temperature range  $40 + 45.5^\circ\text{C}$  where its sensitivity increases  $2.5 + 2.7$  times, compared to its sensitivity at room temperature. Up to  $50^\circ\text{C}$  it is necessary to apply strong polarizing constant fields to the sample. Fields up to  $180 + 200 \text{ v cm}^{-1}$  and with opposite polarity do not affect the sensitivity of the receiver. The author thanks Yu. N. Sil'-vestrov for making available the circuit diagram of an amplifier, and V. P. Konstantinova for various samples. The present paper was read at the Third Conference on Piezoelectricity, which took place in Moscow from January 25 to 30, 1960. There are 5 figures and 4 non-Soviet references.

ASSOCIATION: Institut kristallografii Akademii nauk SSSR  
(Institute of Crystallography of the Academy of Sciences  
USSR)

Card 2/2

85868

S/048/60/024/011/004/036  
BC06/B056

24,7700(1043,1143,1559)

AUTHORS: Konstantinova, V. P., Sil'vestrova, I. K., Shuvalov, L. A.,  
and Yurin, V. A.

TITLE: Production of and Some Ferroelectric Properties of  
Lithium Hydroselenite ↗

PERIODICAL: Izvestiya Akademii nauk SSSR. Seriya fizicheskaya, 1960  
Vol. 24, No. 11, pp. 1318 - 1323

TEXT: The present paper is a reproduction of a lecture delivered on the  
3rd Conference on Ferroelectricity, which took place in Moscow from  
January 25 to 30, 1960. Lithium hydroselenite (denoted by LHS),  
 $\text{LiHSeO}_3 \cdot \text{H}_2\text{SeO}_3$  form monocline crystals of the space group  $P_n$ . Already in  
Ref.1 it has been identified as ferroelectric, and some data were given.  
In the present paper the authors first describe the synthesis and che-  
mical properties of this compound. Fig.1 shows the solubility of LHS as  
a function of temperature (straight line), from which it may be seen  
that this crystal may be grown in the usual manner by temperature

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Production of and Some Ferroelectric  
Properties of Lithium Hydroselenite

S/048/60/024/011/004/036  
B006/B056

decrease. A monocrystal of 100 g grown by the authors is shown in Fig.2. The fusing point of LHS was found to be at  $110.5^{\circ}\text{C}$ , density ..

$\rho = 3.185 \text{ g/cm}^3$ , the angle of monoclinity was  $105^{\circ}$ . The orientation of the crystallographic axes and the position of the main faces are shown in Fig.3. Fig.4 shows the various hysteresis loops, which are found to exist in the individual crystallographic directions of LHS. Also the direction-dependence of the dielectricity constant  $\epsilon_{33}$  (broken line) and the spontaneous polarization  $P_s$  in the cleavage face are shown. Figs.5-6 show  $\epsilon$ , the coercitive force  $E_c$  and the spontaneous polarization as a function of temperature. It was found that  $\epsilon$  and  $P_s$  increase with increasing temperature, whereas  $E_c$  decreases. Fig.7 shows  $\epsilon$  as a function of the electric field strength at various frequencies. ( $E_m$ ) in all cases has a maximum. The authors thank V. A. Frolova, L. N. Kurkovskaya, and K. A. Pluzhnikov for their collaboration and I. S. Zheludev for valuable advice. There are 7 figures, 1 table, and 5 references: 3 Soviet and 2 US.

Card 2/2

24.7800 (1144, 1162)  
9.2181 (2303, 3203)

85873

S/048/60/024/011/009/036  
B0C6/B056

AUTHOR: Sil'vestrova, I. M.

TITLE: The Dependence of the Plasticity Constant  $s_{33}^1$  of a  
Triglycine Sulfate Crystal on a Constant Field Within  
the Range of Curie Point

PERIODICAL: Izvestiya Akademii nauk SSSR. Seriya fizicheskaya, 1960,  
Vol. 24, No. 11, pp. 1337 - 1341

TEXT: The present paper is a reproduction of a lecture delivered on the  
3rd Conference on Ferroelectricity, which took place in Moscow from  
January 25 to 30, 1960. The author gives a report on experimental in-  
vestigations of the influence exerted by a constant electric field  $E_c$   
upon  $s_{33}^1$  of triglycine sulfate (TGS) in the vicinity of the Curie point.  
The measurements were, as usual, made by recording the resonance- and  
antiresonance frequencies of a vibrating TGS Y-cut, the size of the  
samples being  $48.73 \times 3.5 \times 1.5$  mm. The Curie point of the sample was (if  
 $E_c=0$ ), about  $49.1^\circ\text{C}$ , if  $E_c=1000$  v/cm, about  $50.3^\circ\text{C}$ . The results obtained

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The Dependence of the Plasticity Constant  $s'_{33}$   
of a Triglycine Sulfate Crystal on a  
Constant Field Within the Range of Curie Point

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S/048/60/024/011/009/036  
B006/B056

by investigations are all illustrated in form of diagrams. Fig.1 shows the resonance frequency  $f_r$  as a function of  $E$  (polarity is reversed) at various temperatures. The curves show that in reversed polarity  $f_r$  decreases rapidly, after which it increases again; this is all the more the case the closer the temperature approaches Curie point. At  $48.4^\circ\text{C}$ , the original  $f_r$  value was no longer attained by  $(- \rightarrow +)$  reversed polarity. Fig.2 shows  $s'_{33}$  and  $\Delta s'_{33}/s'_{33}$  as temperature functions.  $s'_{33}$  increases with increasing temperature, and after the peak falls very quickly at Curie point. While  $\Delta f_r$  changes from 50 cps at  $20^\circ\text{C}$  to 950 at  $48^\circ\text{C}$ ,  $\Delta s'_{33}$  changes from  $0.36 \cdot 10^{-13}$  to  $6.12 \cdot 10^{-13} \text{ cm}^2/\text{dyn}$  within the same temperature interval. Fig. 3 shows the dependence of  $f_r$  and  $f_{ar}$  (anti-resonance frequency) of  $E$  at reversed polarity, Fig.4 shows  $s'_{33}$  as a function of  $E$ , and Fig.5 shows the coefficient  $K$  as a function of  $E$ ; the temperature data given beside the curves are in centigrades.  $K$  is the electromechanical proportionality factor, defined by

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The Dependence of the Plasticity Constant  $s'_{33}$   
of a Triglycine Sulfate Crystal on a  
Constant Field Within the Range of Curie Point

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B006/B056

$d'_{33} = K \frac{\epsilon_{22}}{4\pi} s'_{33}^{1/2}$ , where  $d'_{33}$  is the piezoelectric modulus,  $\epsilon_{22}$  - the dielectric constant. From the results obtained it may be concluded that, the greater the constant field applied, the less the crystal will be centrically-symmetric. The author thanks I. V. Gavrilova for placing the samples at her disposal, and L. A. Shuvalov for discussing the results. There are 5 figures and 2 references: 1 Soviet and 1 Japanese.

ASSOCIATION: Institut kristallografii Akademii nauk SSSR (Institute of Crystallography of the Academy of Sciences USSR)

Fig.3

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SIL'VESTROVA, I.M.

Dielectric properties of deuterated triglycine sulfate crystals.  
Kristallografiia 6 no.4:582-590 J1-Ag '61. (MIRA 14:8)

1. Institut kristallografii AN SSSR.  
(Glycine crystals--Electrical properties)

10577

5/181/62/004/009/005/045  
0108/0186

10577

1117 1117 1117 and 1117, V. A.

1117 1117 1117 on the piezoelectric and elastic  
properties of trisulfate crystals

1117 1117 1117, v. 4, no. 9, 1962, 2319 - 2327

1117 1117 1117 of this paper were presented at the III soveshchani po  
1117 1117 1117 (III Conference on Ferroelectricity), Moscow, January  
1117 1117 1117 the authors et al., (Izv. AN SSSR, ser. fiz.,  
1117 1117 1117, Kristallografiya, 7, 3, 1962) are continued. The  
elastic moduli  $c_{11}^{11}$ , the electromechanical coupling factor  $k_{23}^1$ , and the  
piezoelectric modulus  $d_{23}^1$  were determined by the resonance method with  
transverse oscillations in the direction of the crystallographic axis c.  
The temperature dependences of the mentioned factors above show similar  
characteristics which are not changed by gamma irradiation. The curves  
begin to drop to zero at 50°C (Curie point) and then rapidly drop to zero.  
1117 1/2



effect of ...

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2106/2136

Irregularities in the whole curve somewhat towards lower temperatures ... In a constant electric field,  $k_{ij}$  and  $H_{ij}$  ... The reduction in peak height is due to the ... It is shown that it is not necessary to apply an infinite ... a constant polarizing field to obtain a ... figures.

Author: ... Institute of Crystallography AN SSSR, Moskva (Institute of Crystallography AN SSSR, Moscow)

... 1967

S/070/62/007/003/007/026  
E132/E460

AUTHORS: Yurin, V.A., ~~Sil'vestrov, I.M.~~, Zheludev, I.S.  
TITLE: The ferroelectric properties of crystals of  
triglycine sulphate irradiated by  $\gamma$ -rays

PERIODICAL: Kristallografiya, v.7, no.3, 1962, 394-402

TEXT: An experimental investigation has been made of the influence of gamma rays on the form and parameters of the hysteresis loop, the influence of steady electric fields and of the temperature on the hysteresis loops of irradiated crystals, and the influence of the  $\gamma$ -rays on the dielectric properties of triglycine sulphate  $(\text{NH}_2\text{CH}_2\text{COOH})_3\text{H}_2\text{SO}_4$ . The results are compared with analogous data for Rochelle salt containing Cu ions. Like the  $\text{Cu}^{++}$  ion, the products of the radiolysis of TGS are charged and interact with the spontaneous internal polarization field. In an applied external field, the radiolysis products redistribute themselves leading to changes in the hysteresis loop (which splits into two loops or may be displaced). The rearrangement of the products tends to stabilize the spontaneous polarization in a particular direction and a much stronger field is required to move it. The greater

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ACC NR: AR6031884

SOURCE CODE: UR/0058/66/000/006/E090/E090

AUTHOR: Sil'vestrova, L. M.; Panova, V. P.; Belyayev, L. M.

TITLE: Investigation of the spectral relationship of the Young modulus and the logarithmic decrement of longitudinal oscillations along the C axis of a cadmium sulfide crystal in the region of its photosensitivity

SOURCE: Ref. zh. Fizika, Abs. 6E710

REF SOURCE: Sb. Nekotoryye vopr. vzaimodeystviya ul'trazvuk. voln s elektronami provodim. v kristallakh. M., 1965, 47-65

TOPIC TAGS: Young modulus, cadmium sulfide, wave propagation, elastic wave, standing wave, photosensitivity

ABSTRACT: A method has been described for determining some parameters needed for amplification of the supersonic waves, including elastic constant waves in the direction of wave propagation, the electromechanical bonding coefficient, and the sample conductivity. From the measured values of changes in the logarithmic decrement of attenuation and the elastic moduli, it is possible to determine the spectral region where an electron interaction of conductivity with the standing and

Card 1/2

ACC NR: AR6031884

elastic wave in a crystal is maximum. The data on conducted measurements may serve as a criterion for sampling the CdS crystals for amplification and may be used for creating resonators with variable light, quality, and frequency. [Translation of abstract]

SUB CODE: 20/

Card

2/2-29/4

I. 111154-65 EEC(b)-2/EMI(1)/EEC(t)/T Pi-4/Pz-6 IJP(c) CG/AT  
 ACCESSION NR: AP5008473 S/0070/65/010/002/0252/0255

AUTHOR: Belyayev, L. M.; Krasil'nikov, V. A.; Lyamov, V. Ye.; Panova, V. P.; Sil'vestrova, I. M.; Smirnov, S. P.; Gil'varg, A. B.

TITLE: Interaction of ultrasonic waves with conduction electrons in cadmium sulfide

SOURCE: Kristallografiya, v. 10, no. 2, 1965, 252-255

TOPIC TAGS: cadmium sulfide, ultrasonic wave, photoconductivity

ABSTRACT: The strong interaction of conduction electrons with acoustic waves along definite crystallographic axes in CdS, together with the photoconductivity of this semiconductor material, which facilitates changing the electron concentration, make cadmium sulfide an excellent material for studying the interaction of ultrasonic waves with conduction electrons. These interactions take the form of attenuation, amplification or modulation of the ultrasonic wave, a change in the voltage-current characteristics of the crystal in a strong electric field, or an electroacoustic effect. All these effects were studied in CdS crystals grown from a melt. The specimens were cut into bars  $4 \times 6 \times 7-8$  mm. The hexagonal axis of the crystal was oriented both parallel with and perpendicular to the long dimension of the bar. Dark conduction was  $10^{-10}-10^{-4} \Omega \cdot \text{cm}^{-1}$ . Illumination reduces the conductivity to

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L 44154-65

ACCESSION NR: AP5008473

$10^{-4}-5 \cdot 10^{-3} \Omega \cdot \text{cm}^{-1}$ . The ends of the specimens were coated with indium by vacuum deposition. It was found that the maximum change in elasticity and in the damping constant takes place at maximum photosensitivity. Amplification of ultrasonic pulses was observed in some specimens when measuring attenuation with the application of an external electric field. The amplification amounted to 2.5-3 db/mm for a frequency of 24 Mc and a field strength of 1200 v/cm. Voltage-current characteristics show a deviation from linearity (current saturation) when the drift rate of the electrons is greater than the speed of the transverse or longitudinal ultrasonic waves (depending on the orientation of the specimen). Nonlinearity increases with the conductivity of the crystal. Drift mobility was found to be  $130-150 \text{ cm}^2/\text{v} \cdot \text{sec}$ . The sign of the electroacoustic emf corresponds to n-type conductivity in CdS. The pulse amplitude of the acoustic emf is on the order of dozens of millivolts. Orig. art. has: 3 figures.

ASSOCIATION: Institut kristallografi AN SSSR (Institute of Crystallography, Academy of Sciences SSSR)

SUBMITTED: 20May64

ENCL: 00

SUB CODE: SS, NP

Card 2/3

L 7818-66 EWT(1)/EPA(s)-2/EWT(m)/EPF(c)/EEC(k)-2/EPF(n)-2/T/EWP(t)/EWP(b)/EWA(c)

ACC NR: AP5028107 IJP(c) JD/GG

SOURCE CODE: UR/0048/65/029/011/2005/2008

AUTHOR: <sup>44,55</sup> Sil'vestrova, I.M.; <sup>44,55</sup> Yurin, V.A.; <sup>44,55</sup> Shuvalov, L.A.; <sup>44,55</sup> Podlesskaya, A.V. 911 91B

ORG: none

TITLE: The piezoelectric effect and internal friction in gamma-irradiated Rochelle salt crystals /Report, Fourth All-Union Conference on Ferro-electricity held at Rostov-on-the Don 12-16 September 1964/ III

SOURCE: AN SSSR. Izvestiya. Seriya fizicheskaya, v. 29, no. 11, 1965, 2005-2008

TOPIC TAGS: <sup>21, 41, 55</sup> ferroelectric crystal, <sup>21, 41</sup> single crystal, gamma irradiation, <sup>21, 41</sup> piezoelectric crystal, elastic modulus, internal friction, electric field

ABSTRACT: The authors have measured the piezoelectric modulus  $d_{14}$ , the electro-mechanical coupling constant  $k_{14}$ , the elastic compliance  $s_{22}^E$ , and the damping constant  $\delta$  for longitudinal mechanical vibrations, of  $\gamma$ -irradiated  $45^\circ$  X-cut Rochelle salt crystal bars at temperatures from 0 to  $35^\circ\text{C}$  and (in the case of  $s_{22}^E$  and  $d_{14}$ ) in the presence dc bias field up to 3 kV/cm. The crystals were irradiated (maximum dose,  $1.2 \times 10^7$  roentgen) at  $3-5^\circ\text{C}$  and stored at this temperature for 1-2 days before measurement. The piezoelectric effect was investigated by the resonance-antiresonance method and the internal friction was measured by the technique described by L.A. Shuvalov and Yu.S. Likhacheva (Izv. AN SSSR. Ser. fiz., 24, No. 11, 1216 (1960)). The effect of  $\gamma$  irradiation on the temperature dependence of all these quantities was similar to

Card 1/2

L 7313-6

ACC NR: AP5028107

6  
its effect on the temperature dependence of the 11-component of the dielectric constant (V.A.Yurin, Izv. AN SSSR. Ser. fiz., 29, 2000 (1965)/see Abstract AP5028106/): the sharp maximum at the Curie point was reduced in magnitude, broadened, and shifted to lower temperatures; in the most highly irradiated samples none of the measured quantities showed maxima and they were all nearly independent of temperature. The measurements of  $s_{22}$  and  $d_{14}$  in the presence of bias fields were made at 12°C. In unirradiated samples both these quantities showed sharp maxima at zero bias. The effect of increasing irradiation was to broaden these maxima, shift them to higher bias fields, and finally to wash them out. The occurrence of maxima in  $s_{22}$  and  $d_{14}$  at non-zero bias fields was associated with the appearance of double hysteresis loops, the bias at which these quantities were maximum being approximately the critical field for the double loop. As the  $\gamma$  irradiation was increased, the maximum values of  $s_{22}$  and  $d_{14}$ , as well as their values at zero bias, first decreased, then increased, and finally decreased again. The authors thank A.A.Agal'tsov and K.A.Pluzhinov for assistance in performing the experiments. Orig. art. has: 3 figures. 44,55

SUB CODE: SS,EM,ME

SUBM DATE: 00/44,55

ORIG. REF: 002

OTH REF: 007

Card 2/2



L 16240-66 EWT(m) ~~ENP(t)~~ ENP(b) IJP(c) JD

ACC NR: AT6002258

SOURCE CODE: UR/2564/65/006/000/0255/0260

AUTHOR: Belyayev, L.M.; Gil'varg, A.B.; Panova, V.P.; Sil'vestrova, I.M.;  
Smirnov, S.P.

ORG: none

TITLE: Growing of CdS crystals from a melt and study of their properties [Paper  
presented at the Third Conference on Crystal Growing held in Moscow from 18 to 25  
November, 1963]

SOURCE: AN SSSR. Institut kristallografi. Rost kristallov, v. 6, 1965, 255-260

TOPIC TAGS: cadmium sulfide, crystal growing, photoconductivity, piezoelectric  
property, zone melting, photosensitivity, crystal defect, dark current, volt ampere  
characteristic

ABSTRACT: The paper describes the apparatus and methods for growing crystals of  
type A<sub>1</sub>BVI from a melt at high pressure and deals with a study of the photoelectric,  
piezoelectric, and other properties of the CdS crystal. The apparatus, the diagrams of  
which are given, made it possible to carry out the growing from the melt under pressure  
both by the method of directional removal of heat and by the method of zone melting.  
Card 1/2

L 1624C-66

ACC NR: A 6002258

The CdS crystals possessed photoconductivity in the 540 — 800 mμ range. A shift of the photosensitivity region toward longer wavelengths indicated the presence of a substantial concentration of defects and possible copper impurities. The difference of dark conductivity ( $10^{-7}$  —  $10^{-10}$  ohm<sup>-1</sup> cm<sup>-1</sup>) indicated that individual crystals and various portions of one and the same crystal were inhomogeneous. The volt-ampere characteristic of the dark current and photocurrent of a crystal were measured, and the piezoelectric moduli and elastic constants were measured by resonance methods. Authors thank V. A. Demin, K. I. Gusenkova, A. V. Podlesskaya, F. I. Dmitriyeva, and V. F. Miuskova for assistance in the work. Orig. art. has: 3 figures and 1 table."

SUB CODE: 20 / SUBM DATE: none / ORIG REF: 003 / OTH REF: 013

Card 2/2

ACC NR: AP6029

SOURCE CODE: CZ/0055/66/016/006/0506/0515

AUTHOR: Sil'vestrova, I. M.

29  
B

ORG: Institute of Crystallography, AN SSSR, Moscow (Institut kristallografii, AN SSSR)

TITLE: Changes in the natural frequency and Q-factor of a photoconducting piezoresonator composed of quartz and cadmium sulfide exposed to light

SOURCE: Chekhoslovatskiy fizicheskiy zhurnal, v. 16, no. 6, 1966, 506-515

TOPIC TAGS: piezoresonator, composite piezoresonator, photoconducting piezoresonator, quartz resonator, cadmium sulfide piezoresonator, resonator, crystal resonator

ABSTRACT: The author presents the results of an experimental study of Young's modulus and the logarithmic decrement of damping in a crystal grown from the melt within the crystal's photosensitive region. The study was based on measurements of changes in the natural frequency and the Q-factor of a resonator composed of quartz and CdS. The results obtained showed that the spectral dependence of the damping decrement was in agreement with theoretical findings. The

Card 1/2

1 11-1

ACC NR: AP6029412

spectral dependence of Young's modulus, however, was found to agree only qualitatively with theoretical findings; quantitative agreement was only partial. The study showed that by measuring changes in decrement and in Young's modulus, it is possible to determine the crystal's spectral region of maximum reaction between conductivity electrons and the standing elastic wave, its electromechanical coupling coefficient, elastic constant, and conductivity. Such measurements may be used as a basis for selecting crystals for ultrasonic magnification and the manufacture of resonators whose Q-factor and frequency are a function of light. Orig. art. has: 12 figures. [Based on author's abstract] [SP]

SUB CODE: 2"/ SUBM DATE: none/ SOV REF: 003/ OTH REF: 004/

1.2  
Cord 2/2

L 09383-67 EWT(1)/ENT(m)/ENP(t)/ETI IJP(c) GG/JD

ACC NR: ARG033775

SOURCE CODE: UR/0058/66/000/007/A051/A051

59

AUTHOR: Belyayev, L. M., Gil'varg, A. B.; Panova, V. P.; Sil'vestrova, I. M.; Smirnov, S. P.

TITLE: Growing cadmium sulfide crystals from the melt and an investigation of their properties

SOURCE: Ref. zh. Fizika, Abs. 7A435

REF SOURCE: Sb. Nekotoryye vopr. vzaimodeystviya ul'trazvuk. voln. s elektronami provodim. V kristallakh, M., 1965, 33-46

TOPIC TAGS: crystal, cadmium sulfide, melt, cadmium sulfide monocrystal, photoconductivity, visible region, dark current, piezoelectric modulus, elastic modulus

ABSTRACT: A description is given of apparatus for growing large crystals of the

$A^{II}B^{VI}$  type from the melt under pressure, both by the method of controlled heat removal and the method of zone refining. The working space is heated by using a resistance furnace or high-frequency current. Cadmium sulfide monocrystals are

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L 09383-67

ACC NR: AR6033775

obtained and measurements were made of their photoelectric and optical properties (spectral photoconductivity curves, transmission spectrum in the visible region, dark current volt-ampere characteristics, lux-ampere characteristics) and piezoelectric moduli and elastic moduli at a constant field intensity and constant inductance. The results were found to be in good agreement with published data on crystals grown from the gas phase. However, the monocrystals obtained from melt are found to be less homogeneous. See also Ref. Zh. Fiz. 1966, 5A553. L. Rashkovich. [Translation of abstract]

SUB CODE: 20/

Card 2/2 ml

ACC NR: AR6035054

SOURCE CODE: UR/0058/66/000/008/E072/E072

AUTHOR: Krasil'nikov, V. A.; Belyayev, L. M.; Lyamov, V. Ye.;  
Sil'vestrova, I. M., Uchastkin, V. I.

TITLE: Investigation of the acoustical-electrical effect in cadmium sulfide  
monocrystals

SOURCE: Ref. zh. Fizika, Abs. 8E550

REF SOURCE: Sb. Nekotoryye vopr. vzaimodeystviya ul'trazvyk, voln s  
elektronami provodim. v kristallakh. M., 1965, 95-110

TOPIC TAGS: crystal, cadmium sulfide, monocrystal, acoustical electrical  
effect

ABSTRACT: A study was made which showed that within the frequency range of  
20--75 Mc, the Weinrich formula is satisfied (at least qualitatively) in piezo-  
semiconductors for the acoustic electric effect (AEE). In cadmium sulfide mono-  
crystals AEE is considerable and because of its linear dependence on ultrasound  
may be used to measure ultrasound intensity in solids. The spectral character-  
istics of acoustic-electric emf (AEMF) do not agree with the theoretical (see

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ACC NR: AIR6035054

reference 8E549 in the issue). The sharp increase in AEMF under nonuniform illumination of a sample makes it possible to use this method for increasing the sensitivity of acoustic-electrical meters in practical applications of AEE.

[Translation of abstract]

[SP]

SUB CODE: 20/

Card 2/2



USSR/Physical Chemistry - Thermodynamics, Thermochemistry, Equilibria.  
Physical Chemical Analysis, Phase Transitions.

B-3

Abs Jour: Referat. Zhurnal Khimii, No 2, 1958, 3815.

Author : B.G. Korshunov, N.A. Sil'vestrova.

Inst : Moscow Institute of Fine Chemical Technology.

Title : Study of Interaction Between Niobium Pentachloride and  
Zirconium Tetrachloride with Magnesium Chloride in Melts.

Orig Pub: Tr. Mosk. in-ta tekhnol. khim. tekhnol, 1956, vyp. 6, 21-25.

Abstract: The feasibility graphs of the  $\text{NbCl}_5$  -  $\text{MgCl}_2$  and  $\text{ZrCl}_4$  -  $\text{MgCl}_2$  systems were studied. The solubility of  $\text{MgCl}_2$  in melted  $\text{NbCl}_5$  and  $\text{ZrCl}_4$  is very little. The eutectic of the 1st system is at 97% of  $\text{NbCl}_5$  and  $192^\circ$ ; the eutectic of the 2nd system is at 98.5% of  $\text{ZrCl}_4$  and  $426^\circ$ .  $\text{NbCl}_5$  and  $\text{ZrCl}_4$  do not dissolve in melted  $\text{MgCl}_2$ . The vapor pressure of  $\text{NbO}_5$  on the melted mixture of 30% by weight of  $\text{MgCl}_2$  and 70% by weight of  $\text{NbO}_5$  determined by the flow method (chlorine the carrier) is approximately equal

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USSR/Physical Chemistry - Thermodynamics, Thermochemistry, Equilibria,  
Physical-Chemical Analysis, Phase Transitions.

B-8

Abs Jour: Referat. Zhurnal Khimiya, No 2, 1958, 3815.

to the  $\text{NbCl}_5$  vapor pressure at the corresponding temperature,  
which indicates the possibility of a complete separation of  
 $\text{NbCl}_5$  and  $\text{ZrCl}_4$  from  $\text{MgCl}_2$  by sublimation.

Card : 2/2

-51-

SEVAST'YANOV, I.I., sotrudnik; SIL'VESTROVA, N.H., sotrudnik

New brushes for cleaning flats. Tekst.prom. 19 no.4:91 Ap '59.  
(MIRA 12:6)

1. TSentral'nyy nauchno-issledovatel'skiy institut izdeliy i zapasnykh  
detailey k tekstil'nomu oborudovaniyu.  
(Carding machines--Maintenance and repair)

SELYANSKIY, I. V., KOVACH, R. V., RYKOVA, A. V., PAVLOVA, T. V.,  
STASHIN, I. V., GUSEVICH, N. I., VETSEVICH, M. R.

"New developments in the study of the natural focus of the plague in the  
northeastern Caspian region." p.239

Devyatoye Soveshchaniye po parazitologicheskim problemam i  
virologicheskim bolezniam. 22-29 Oktabrya 1959 g. (Tenth Conference  
on Parasitological Problems and Diseases with Natural Foci 22-29  
October 1959), Moscow-Leningrad, 1959, Academy of Medical Sciences  
USSR and Academy of Sciences USSR, No. 1 254pp.

Antiplague Observation Station, Moscow

L 9252-66 EWT(1)/EWT(m)/EWP(w)/T/EWP(t)/EWP(b) I.P(c) JD  
ACC NR: AP5022724 SOURCE CODE: UR/0181/65/007/009/2789/2792

AUTHOR: Bol'shutkin, D. N.; Prokhvatilov, A. I.; Sil'vestrova, T. V.; Startsev, V. I.

ORG: Physicotechnical Institute of Low Temperatures AN UkrSSR, Kharkov (Fiziko-  
tekhnicheskii institut nizkikh temperatur AN UkrSSR)

TITLE: Mechanical properties of polycrystalline ammonia under unilateral compression

SOURCE: Fizika tverdogo tela, v. 7, no. 9, 1965, 2739-2792

TOPIC TAGS: ammonia, solid mechanical property, low temperature physics

ABSTRACT: The strength and ductility of polycrystalline ammonia are studied as functions of temperature under unilateral pressure. Cylindrical specimens 10 mm in diameter and 40 mm long with uniform microstructure and polished ends were studied at temperatures from 77 to 160°K. Curves are given for the breaking point, limit of proportionality and relative compression as functions of temperature. These data show that crystalline ammonia has extremely low strength properties and ductility. Solid ammonia is quite brittle at the temperature of liquid nitrogen and shows elastic deformation right up to the breaking point. At stresses of 0.5-0.6 kg/mm<sup>2</sup>, cracks are formed parallel to the axis of the specimen with an accompanying characteristic

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L 9252-66

ACC NR: AP5022724

sound and a slight reduction in loading (up to 100 g). The final breaking stress of  $\sim 0.8 \text{ kg/mm}^2$  remains constant throughout the experimental temperature range. At this point there is an instantaneous reduction in loading to zero and the specimen is shattered. The shape of the fragments and the slight degree of deformation before the breaking point show that cleavage is the mechanism responsible for fracture of ammonia crystals between 77 and 130°K. Above 130°K ( $0.6 T_m$ ), the ductility of the specimens increases and creep is observed under a constant<sup>m</sup> load. Shearing is responsible for fracture above this point since cleavage strength remains nearly constant with temperature, while an increase in temperature causes a considerable reduction in shearing strength. The relationship between rate of uniform creep  $V$  and stress  $\sigma$  is  $V = A\sigma^n$ , where  $A$  and  $n$  are constants equal to 500 and 5 respectively at 160°K and stresses greater than the limit of proportionality. The energy of creep activation is found to be 5.6 Kcal/mol. This is approximately 10% lower than the heat of sublimation for solid ammonia. Orig. art. has: 3 figures.

SUB CODE: 07,20/

SUBM DATE: 16Apr65/

ORIG REF: 005/

OTH REF: 010

Cord 2/2 *ju*

PROKHVATILLOV, A.I.; PUSTOVALOV, V.V.; SIL'VESTROVA, T.V.; STARTSEV, V.I.

Temperature dependence of the hardness of crystalline ammonia.  
Ukr.fiz.zhur. 10 no.10:1127-1132 O '65.

(MIRA 19:1)

1. Fiziko-tehnicheskii institut nizkikh temperatur AN UkrSSR,  
Khar'kov. Submitted December 15, 1964.

SAPUTRYAYEV, B.A.; SIL'VESTROVA, T. Ye.

Quantitative determination of benzohexonium with the cation  
exchange resin KU-1. Med. promyshl. SSSR 17 no.8:37-39 Ag'63  
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1. Leningradskiy khimiko-farmatseticheskiy institut.



SIMIGIN, P.A.; SIL'VESTROVA, Z.N.; RADOVITSKAYA, K.P.

Various methods of imparting water-repellent properties to cotton fabrics. Tekst.prom. 22 no.12:52-57 D '62.

(MIRA 16:1)

1. Sotrudniki Tsentral'nogo nauchno-issledovatel'skogo instituta khlochatobumazhnoy promyshlennosti.  
(Waterproofing of fabrics)

KOROLEV, Aleksandr Sergeyevich, incl.; NAKOV, Igor' Nikolayevich,  
incl.; KLEKOV, G.K., Russk. red.; SIL'VESTROVICH, G.A.,  
red.

[Handbook for beginning electrical machinery winding  
reptirman] Spravochnik molodogo otmotchika elektriche-  
skikh mashin. Izd. 2., 1 apr. 1 dok. Moskva, Vysshaya  
shkola, 1964. 309 p. (MIRA 18:1)

KARNEV, Viktor Nikolayevich; IYAGUA, S.G., transl. G.A.;  
SIL'VESTROVICH, G.A., red.

[Installation and maintenance of secondary systems]  
Montazh i obsluzhivanie vtorichnykh ustroystv. Izd.2.,  
perer. Moskva, Vysshaya shkola, 1965. 549 p.  
(MIRA 18:5)

SIL'VESTROVICH, I. I.

Electron-microscopic study of the surface of electrodes in a glow discharge.  
A. M. Shemaev, A. I. Frimer, and I. I. Sil'vestrovich. Invest. Akad. Nauk S.S.S.R.,  
Ser. Fiz. 15, 413-17(1951).- Sheet electrodes of Ni, Ag, Ta, Mo, and W were sealed in  
discharge tubes 25-30 mm. outside diameter, 120 mm. long, filled with Ne of 600  $\mu$  pressure  
and operated on 3-5kv. a.c. or d.c. The tubes operated on the pump (at constant  
pressure) or were sealed off the pump and cleaned up (variable pressure). Ta, for  
example on a d.c. supply, cleaned the gas up entirely in 1 hr. Electron micrographs  
show that low-melting materials such as Ni on a.c. and at constant pressure give  
surfaces covered with a no. of cones and traces of melting which later go over into a  
large, partially molten structure. On d.c. the structure with molten cones is enhanced.  
In refractory metals the cathodes are etched and the cubical structure appears. At  
variable pressure the etching effect appears also on Ni without traces of melting.  
Islands of insulating materials enhance the effects considerably because of local  
high-field strength regions. Etching at variable gas pressure is recommended for metal-  
lographic studies in preference to chem. etching. S.P.



SHILOVTSOVA, S.I., kandidat tekhnicheskikh nauk, redaktor; SHILOVTSOVA,  
L.M., redaktor; PANOVA, L.Ya., tekhnicheskiy redaktor

[The effect of blasting in the ground and calculation of charges;  
collected articles] *Deistvie vzryva v grunte i raschet zariadov*;  
sbornik statei. Moskva, Gos. izd-vo lit-ry po stroitel'nym materialam,  
1954. 128 p. [Microfilm] (MIRA 8:2)  
(Blasting)

SIL'VESTROVICH, S. I.

*Mater*

1084. Fritting of cordierite porcelain. <sup>15</sup>  
No. 21, 100, 1953.

S. I. SIL'VESTROVICH (Moscow: Proc. Tech. Inst.,

*4E2C*

*PM*

*7*

112-6-11808

Translation from: Referativnyy zhurnal, Elektrotekhnika, 1957, No: pp.13-14 (USSR)

AUTHOR: Silvestrovich, S.I.

TITLE: Frit Cordierite Porcelain (Frittovyy kordiyeritovyy farfor)

PERIODICAL: Trudy Mosk. khimiko-tekhnolog. in-ta, 1956, #21, pp.100-112

ABSTRACT: Ordinary feldspar porcelain cannot meet the requirements of various branches of industry. Its inadequate physical, mechanical, and thermal properties are due to the high (50-60%) content of the quartz-feldspar vitreous phase. Frit-type porcelains were investigated in which the feldspar had been partly or completely replaced with the frit, i.e., an artificial glass with the composition  $2\text{MgO} \cdot 2\text{Al}_2\text{O}_3 \cdot 5\text{SiO}_2$  corresponding to nonferrous cordierite. Frit glasses produced by melting together of magnesite, kaolin, and quartz sand have higher viscosity, higher dissolving capacity toward quartz and clay materials, and have a higher tendency to crystallize particularly in the interval 1320-1380°C. Sintering of the cordierite porcelain takes place in a shorter temperature interval as the process is more rapid than in the case of feldspar porcelain. A characteristic feature of microstructure of the cordierite porcelain is the new crystalline formations in addition to the mullite crystals; the new crystals are due to cordierite frit. The glass phase is of grainy nature and is much less extensive than in feldspar porcelain.

Card 1/2



112-6-11868

Translation from: Referativnyy zhurnal, Elektrotehnika, 1957, No. 14 (USSR)

In this connection specimens of cordierite porcelain have higher (25-35%) mechanical strength, higher fire resistance, and very low coefficient of linear expansion ( $0.6$  to  $1.5 \times 10^{-6}$  degree $^{-1}$  at  $800^{\circ}\text{C}$ ). Specimens of feldspar cordierite porcelains also show an increase in the mechanical strength

Bibliography: 22 titles

N.V.N.

Card 2/2

KRASHKOV, Anatoliy Pavlovich; SIL'VESTROVICH, S.I., nauchnyy redaktor;  
GOMOZOVA, N.A., redaktor; GLADIKH, N.N., tekhnicheskiiy redaktor.

[Silicon organic compounds in engineering] Kremniorganicheskie  
soedineniia v tekhnike. Izd.2-oe, perer. i dop. Moskva, Gos.izd-vo  
po stroit. materialam, 1956. 288 p. (MLRA 10:4)  
(Silicon organic compounds)

Silvestrovich, S. I.

<sup>16</sup>  
 Fritted cordierite porcelain. S. I. Silvestrovich. *Trudy Moskov. Khim. Tekhnol. Inst. im. D. I. Mendeleeva*, 1956, No. 21, pp. 100-112. The cordierite frit, which replaced the feldspar, analyzed  $\text{SiO}_2$  48.11,  $\text{Al}_2\text{O}_3$  34.01,  $\text{Fe}_2\text{O}_3$  1.62,  $\text{CaO}$  1.66,  $\text{K}_2\text{O}$  14.14,  $\text{K}_2\text{O} + \text{Na}_2\text{O}$  0.33, and ignition loss 0.18%. In contrast to ordinary feldspar porcelain, the structure of fritted cordierite porcelain was characterized by deeper changes: better assimilation of quartz grains in the body, less vitreous phase of peculiar granular structure, and predominance of crystalline phase. The crystalline phase is the result primarily of the crystallization of the cordierite frit, pyroxene and chiefly cordierite. Mafite plays a secondary role in the structure of these porcelains and is predominantly of coarse crystals. The cordierite porcelain sinters at somewhat higher temperatures than feldspar porcelain and has a shorter sintering interval. It has a very low coefficient of linear expansion, high thermal stability, and increased strength. Its thermomechanical properties are higher than those of ordinary feldspar porcelain. The following compositions are of practical interest: (1) clay 18.5,  $\text{Al}_2\text{O}_3$  27.5, quartz sand 18.2, and cordierite frit 37.8; and (2)  $\text{Al}_2\text{O}_3$  24.5, quartz sand 18.2, and cordierite frit 57.3.

4E2c

MATVEYEV, M.A.; ~~SIL'VESTROVICH, S.I.~~, nauchnyy redaktor; NIKOLAYEVA, N.M.,  
redaktor; ~~PIYAKOVA, N.D.~~, tekhnicheskiy redaktor

[Solubility of glass forming sodium silicate] Rastvorimost'  
stekloobraznykh silikatov natriia. Moskva, Gos.izd-vo lit-ry  
po stroit.materialam, 1957. 94 p. (MLRA 10:9)  
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SIL'VESTROVICH, S.I.; LEYBUSH, V.I., redaktor; PYATAKOVA, N.D.,  
~~tekhnicheskiy~~ redaktor.

[Explosives and specifications for their safe storage] Vzryvchatye  
veshchestva i uslovia ikh bezopasnogo khraneniia. Moskva, ~~Proiz-~~  
stroizdat, 1957. 98 p. (MIRA 10:6)  
(Explosives--Safety measures)

SIL'VESTROVICH, S.I.; SEBTYURIN, G.O.; TERESHCHENKO, S.O.

Use of finely dispersed materials in glass manufacture. Trudy MCHTI  
no.24:279-297 '57. (MIRA 11:6)

(Glass manufacture)

PAVLUSHKIN, N.M.; SENTYURIN, G.G.; SIL'VESTROVICH, S.I., kand.tekhn.  
nauk, nauchnyy red.; GLADYSHEVA, S.A., red.; GILSON, P.G.,  
tekhn.red.

[Handbook of glass technology] Praktikum po tekhnologii stekla.  
Moskva, Gos.izd-vo lit-ry po stroit.materialam, 1957. 354 p.  
(MIRA 11:1)

(Glass)

SIL'VESTROVICH, S.I.

Stained opal glass. Trudy MKHTI no.24:298-313 '57. (MIRA 11:6)  
(Glass, Colored)



AUTHORS: Kitaygorodskiy, I. I., SOV/72-58-11-6/15  
Sil'vestrovich, S. I., Chetverikova, L. N.

TITLE: Technical Stone From Glass Corundum (Tekhnicheskiy kamen' iz steklokorunda)

PERIODICAL: Steklo i keramika, 1958, <sup>15</sup> Nr 11, pp 17 - 21 (USSR)

ABSTRACT: The synthesis of thick, sintered glass corundum was previously only carried out for the process of producing fire-resistant materials, as can be seen from the papers of I. I. Kitaygorodskiy, N. V. Solomin, A. I. Polinkovskaya, and S. F. Volchanov (Ref 1). In the work reported in this paper the authors used alkali-low and alkali-free aluminum-silicate glasses with high  $Al_2O_3$  and  $MgO$  contents, whose positive influence upon the sintering and strengthening processes for ceramic materials was demonstrated in the paper by S. I. Sil'vestrovich (Ref 2). The chemical composition of the glasses and their characteristic properties are given in table 1. The gradation of grain sizes and the specific surface of the fine dispersion powder of the glass and the electrocorundum are given in table 2. The influence of the kind and amount of the glassy phase upon the degree

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Technical Stone From Glass Corundum

SOV/72-58-11-6/15

of sintering and strengthening of the glass corundum is indicated in figure 1, while the influence of the burning temperature is shown in figure 2. Table 3 shows the values for the characteristic physical and technical properties of the synthetic glass corundum. Experiments showed that the greatest strength of the glass corundum is related to an optimal content of the glassy phase. Table 4 compares the physical and technical properties of the natural stones agate, jasper and quartzite. The glass corundum is not inferior in its heat mechanical properties to the naturally-occurring stones. There are 2 figures, 4 tables, and 4 references, which are Soviet.

Card 2/2

PHASE I ROCK EXPLOITATION

SOV/3591

- Vsesoyuznoye khimicheskoye obshchestvo imeni D.I. Mendeleeva

Silikaty; sbornik statey po khimii i tekhnologii silikatov, vyp. 1 (Silicates; Collection of Articles on the Chemistry and Production of Silicates, No. 1) Moscow, Gosstroyizdat, 1959. 105 p. Errata slip inserted. 3,000 copies printed.

Editorial Board: M.A. Matveyev (Resp. Ed.), Yu.M. Butt, and M.O. Yushkevich; Ed. of Publishing House: V.A. Rozanova; Tech. Ed.: N.I. Rudakova.

PURPOSE: This booklet is intended for chemists and geologists interested in silicate analysis.

COVERAGE: This is a collection of articles on the chemistry and technology of silicates. The contributing authors discuss the effect of admixtures on sintering processes and on the properties of Portland cements. The text also discusses the properties of certain glasses, the processing of ceramic materials, the process of drying facing tile, the stability of solid solutions of calcium

Card 1/3

Silicates; Collection (Cont.)

SOV/3592

alumoferrite, the activation of cement, the production of aluminous cement, the preparation of pulping rolls, the interaction of quartz with lime, and various problems related to the production of silicate-calcite materials. No personalities are mentioned. References are given at the end of each article.

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Silicates; Collection (Cont.)

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AVAILABLE: Library of Congress Card 3/3	TM/lsh 5-18-60

SIL'VESTROVICH, S.I.

Properties of fluoride and phosphate opal glasses. Silikaty no.1:3-13  
'59. (MIRA 13:2)

(Glass research)

NIKOLSKII, I.I.; SIL'VESTROVICH, S.I.; ELLEN, G.A.

Glasses with higher microhardness. Trudy VNTI no.27:23-37 '59.  
(MIRA 15:6)

(Glass)

KITAYGORODNIY, I. I.; SILVESTROVICH, S. I.

Effect of the glassy phase on the process of sintering and properties  
of corundum materials. Trudy MKHTI no.27:38-64 '59. (MIRA 15:6)  
(Corundum--Analysis)



SIL'VESTROVICH, S.I.; RABINOVICH, E.M.

Structure and properties of fluor and phosphate opal glasses. Trudy  
MKHTI no.27:78-97 '59. (MIRA 15:6)  
(Glass research)

15.2120

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5-11

AUTHORS: Sil'vestrovich, S. I., Boguslavskiy, I. A. SOV/20-129-6-46/69

TITLE: Increase in the Strength of Glass<sup>15</sup> as a Consequence of Its Treatment With Organosilicon<sup>14</sup> Compounds

PERIODICAL: Doklady Akademii nauk SSSR, 1959, Vol 129, Nr 6, pp 1362 - 1365 (USSR)

ABSTRACT: The low value of mechanical strength of glass as compared with the theoretical strength computed from the values of atomic bonds is due to the inner structural defects as well as to the ultramicroscopic surface cracks (Ref 1). The authors investigated the possibility of increasing the strength of glass by simultaneous chemical and thermal treatment. The glass surface was exposed to the chemical effect of organosilicon compounds combined with various methods of heat treatment. The test material was industrial window glass of the Gor'kovskiy steklo-zavod (Gor'kiy Glass Factory) with the composition (in %):  $\text{SiO}_2$  72;  $\text{Al}_2\text{O}_3$  1.43;  $\text{Fe}_2\text{O}_3$  0.12;  $\text{CaO}$  7.37;  $\text{MgO}$  4.03;  $\text{SO}_3$  0.38;  $\text{Na}_2\text{O}$  14.72. The glass samples were parallel epipeds, thickness: 6 or 3 mm, width: 6 mm, length: 42 mm; all facets were ground and polished. The limit of the bending stress was 5.1 kg/mm<sup>2</sup>.

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Increase in the Strength of Glass as a Consequence of  
Its Treatment With Organosilicon Compounds

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SC7/20-129-6-46/69

The samples were rinsed in a weakly alkaline solution and allowed to lie in a 5% HCl solution for 30 minutes at room temperature. Pores and a very fine silica film were formed on the surface by partial leaching. This favors the combination of the later-formed polymer film with the glass. At first, the glass was kept for 5-15 minutes in monomeric organosilicon compounds diluted with benzene. Then the samples underwent thermal treatment between 200 and 650° and were cooled in the air. Thus, the mentioned polymer  $[\text{SiO}_2]_n$  surface film was to be formed. Figure 1 shows that the glass was best solidified by strongly concentrated  $(\text{C}_2\text{H}_5)_2\text{SiCl}_2$  and  $\text{C}_6\text{H}_5\text{SiCl}_3$  solutions and a heat treatment at 650°. The polymer film "cements" the glass surface and, apparently, closes the microcracks. The mechanical strength of the glass was doubled by heat treatment at 200-300°, and trebled at 650°. Moreover, the glass was chilled in an organosilicon liquid. The glass samples were heated to molification in the furnace, and then rapidly dipped into a diethylpolysiloxane liquid with increased heat resistance. Previously, the liquid

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68:75

Increase in the Strength of Glass as a Consequence of Its Treatment With Organosilicon Compounds SOV/20-129-6-46/69

had been heated to 200°, 180°, 160°, 140°, etc. The chilled samples were dried at 200°. Figure 2 shows that the strength of the glass increases rapidly due to this hardening. This increase depends on the temperature difference  $\Delta t$  between the heated glass and the hardening liquid. With an optimum  $\Delta t$ , the bending stress of the 3-mm glass increases 11 times, that of the 6-mm glass even more (Fig 2). The inner residual stresses are only slightly higher than those in the usual hardening of glass in the air. Thus, the increased strength of the glass hardened in the above manner is, above all, due to the effect of the polymer film ("armor"). The new method has numerous advantages. The name of A. F. Ioffe is mentioned in the paper. The authors thank Professor I. I. Aitaygorodskiy for his interest in their investigation. There are 2 figures and 8 references, 7 of which are Soviet. ✓

ASSOCIATION: Moskovskiy khimiko-tehnologicheskii institut im. D. I. Mendeleeva  
(Moscow Institute of Chemical Technology imeni D. I. Mendeleev)

PRESENTED: July 24, 1959, by P. A. Rebinder, Academician

SUBMITTED: July 22, 1959 ✓

Card 3/3

AFANAS'YEV, A.N., kand.tekhn.nauk; BASOV, N.I., kand.tekhn.nauk; BELO-  
VITSKIY, A.A., inzh.; VESELOVSKIY, V.S., doktor tekhn.nauk, prof.;  
GORELIK, B.I., kand.tekhn.nauk; DORONENKOV, I.M., inzh.; ZAK, D.L.,  
inzh.; IVOMIN, V.I., inzh. [deceased]; KLINOV, I.Ya., doktor tekhn.  
nauk, prof.; LEVIN, A.N., doktor tekhn.nauk, prof.; LEVIN, S.N.,  
kand.tekhn.nauk; LEPETOV, V.A., kand.tekhn.nauk; LEONT'YEV, N.L.,  
doktor tekhn.nauk, prof.; LOKHINA, P.I., kand.tekhn.nauk; MATVEYEVA,  
L.V., inzh.; MIKHAYLOV, A.M., doktor tekhn.nauk, prof.; MUDRIK, Kh.I.,  
kand.tekhn.nauk; PERLIN, S.M., inzh.; SALAZKIN, K.A., kand.tekhn.nauk;  
SIL'VESTROVICH, S.I., kand.tekhn.nauk; SOKOLOVSKAYA, S.I., kand.  
tekhn.nauk; KHENKIN, A.A., inzh.; KHUKHRYANSKIY, P.M., doktor tekhn.  
nauk, prof.; SHEYDEMAN, I.Yu., kand.tekhn.nauk; YASHUNSKAYA, P.I.,  
kand.tekhn.nauk; POGODIN-ALEKSEYEV, G.I., doktor tekhn.nauk, prof.,  
red.; RYBAKOVA, V.I., inzh., red.isd-va; SOKOLOVA, T.F., tekhn.red.

[Handbook on materials used in the manufacture of machinery] Spra-  
vochnik po mashinostroitel'nym materialam; v chetyrekh tomakh. Pod  
red.G.I.Pogodina-Alekseeva. Moskva, Gos.nauchno-tekhn.isd-vo ma-  
shinostroit.lit-ry. Vol.4. [Nonmetallic materials] Nemetallici-  
eskie materialy. Red.toma A.N.Levin. 1960. 723 p.

(MIRA 13:7)

(Machinery industry)

(Nonmetallic materials)

15(2)

50V/72-6C-1-4/17

AUTHORS: Sil'vestrovich, S. I., Boguslavskiy, I. A.

TITLE: The Use of Organosilicon Compounds to Improve Glass Properties

PERIODICAL: Steklo i keramika, 1960, Nr 1, pp 7-12 (USSR)

ABSTRACT: The authors of the present paper studied the influence of organosilicon compounds on glass properties. In their investigations at the Chair of Glass Technology of the Moskovskiy khimiko-tekhnologicheskii institut imeni Mendeleyeva (Moscow Institute of Chemical Technology imeni Mendeleyev) they tried to study the physicochemical glass properties more thoroughly than it was done in previous papers by A. P. Kreshkov, M. G. Voronkov, and B. I. Dolgov, A. Ya. Korolev, L. M. Vinogradova. The investigations dealt with the hydrophobic nature, the chemical stability, thermal stability and mechanical strength of glass treated under certain conditions with organosilicon compounds. The investigation results are given in figures 1-6 and in the table. The mechanical strength of glass is increased by the elimination of surface cracks as was shown in the papers by S. M. Zhurkov, G. M. Bartenev, A. I. Ivanova, M. S. Aslanova, and P. A. Rebinder. In conclusion, the authors state that a high increase in the strength of glass hardened in an organo-

Card 1/2

BOGUSLAVSKIY, I., inzh.; SIL'VESTROVICH, S.<sup>I</sup>, kand. tekhn. nauk

Reinforced glass. Tekh. mol. 28 no. 4:5 '60.  
(Glass, Safety)

(MIRA 13:11)

S/063/60/005/002/005/006  
A003/A001

AUTHORS Sil'vestrovich, S. I., Candidate of Technical Sciences, Rabinovich, E.M.  
TITLE Glasslike-Crystalline Materials  
PERIODICAL Zhurnal vsesoyuznogo khimicheskogo obshchestva im. D. I. Mendeleeva,  
1960, Vol. 5, No. 2, pp. 186-191

TEXT. Glasslike-crystalline materials are obtained by introducing special mineralizers with a crystal lattice similar to that of the separating crystalline phases of the glass. There are two types of mineralizers: colloidal dyestuffs (Cu, Ag, Au, etc.) and dampers (F, TiO<sub>2</sub>, SnO<sub>2</sub>). Colloidal dyestuffs are introduced into the glass charge with a reducing agent (tartaric acid, etc.) and tin dioxide or stannous oxide. It is assumed that the copper, gold and silver ions are reduced to neutral atoms. Tin dioxide increases their solubility. Recently glasses were obtained which are sensitive to ultraviolet radiation (Refs. 25-32). The neutral gold atoms form a latent image and are similar to sensitivity centers in photographic emulsions under the action of light (Ref. 24). At higher holding temperatures the colloidal particles become centers of heterogeneous crystallization of the silicates. The process of heterogeneous crystallization of silicates in

and 1/2



## Glasslike-Crystalline Materials

3/063/60/005/002/005/006  
A003/A001

glasses containing dampers differs from the same process in light-sensitive glasses. It was shown (Ref. 33) that fluorine ions penetrate into the silicon-oxygen frame, replacing the oxygen and forming a complex anion. Under the condition of fast cooling the reverse substitution of fluorine by oxygen proceeds incompletely. The content of alkali ions is inversely proportional to the size of the anions mentioned and directly proportional to the solubility of fluorides. The behavior of other dampers ( $\text{TiO}_2$ ,  $\text{SnO}_2$ ) in the glasses is studied to a lesser degree. The assumptions mentioned were studied in the crystallization of some fluorine-containing glasses molten in a kerosene furnace at  $1,550^\circ\text{C}$  with a holding time of 4 hours. The composition of the glasses is cited in a table. Glass 31 starts actively crystallizing at  $700^\circ\text{C}$ , glass 81 at  $800^\circ\text{C}$  and glass 101 shows almost no signs of crystallization at  $800^\circ\text{C}$ . The strength of glasses 31 and 81 increased by 3-4 times to  $33 \text{ kg/mm}^2$  as a result of the crystallization. The curves of the isothermal change of the volumetric weight during crystallization were also analyzed. The analysis of roentgenograms showed that after a 6-hour holding at  $750^\circ\text{C}$  the formation of muscovite type crystals is observed in glass 81. Endothermic effects on the heating curves of glass 81 are explained by the melting of fluorides. The study of the low-temperature stage of thermal treatment shows that the holding time at  $750^\circ\text{C}$  should not exceed 12-14 hours, at  $800^\circ\text{C}$  7 hours, etc. There are 4 figures, 1 table and 50 references: 35 Soviet, 11 English and 4 German.

Card 2/2

KITAYGORODSKIY, I.I., doktor tekhn. nauk, prof.; KACHALOV, N.N., prof.;  
VARGIN, V.V., doktor tekhn. nauk, prof.; YEVSTROP'YEV, K.S.,  
doktor tekhn. nauk, prof.; GINZBURG, D.B., doktor tekhn. nauk,  
prof.; ASLANOVA, M.S., doktor tekhn. nauk, prof.; GURFINKEL', I.Ye.,  
inzh.; ZAK, A.P., kand. tekhn. nauk; KOTLYAR, A.Ye., inzh.; PAVLUSH-  
KIN, N.M., doktor tekhn. nauk, prof.; Sentyurin, G.G., kand. tekhn.  
nauk; SIL'VESTROVICH, S.I., kand. tekhn. nauk, dots.; SOLINOV, F.G.,  
kand. tekhn. nauk; SOLOMIN, N.V., doktor tekhn. nauk, prof.; TEMKIN,  
B.S., kand. tekhn. nauk; GLADYSHEVA, S.A., red. izd-va; TEMKINA, Ye.L.,  
tekhn. red.

[Glass technology] Tekhnologiya stekla. Izd.3., perer. Moskva, Gos.  
izd-vo lit-ry po stroit., arkhitekt. i stroit. materialam, 1961. 622 p.  
(MIRA 14:10)

1. Chlen-korrespondent AN SSSR (for Kachalov).  
(Glass manufacture)

IS 2610

31611

S/053/61/006/006/004/006

A057/A126

AUTHORS: Kitaygorodskiy, I. I., Professor, Sil'vestrovich, S. I., Candidate of Technical Sciences

TITLE: The problem of increasing strength and heat resistance of glass

PERIODICAL: Zhurnal vsesoyuznogo khimicheskogo obshchestva imeni D. I. Mendeleeva, v. 6, no. 6, 1961, 635 - 642

TEXT: A discussion on the improvement of glass properties is presented with a review of corresponding literature and some experimental results of the present authors and others. First were discussed glass properties in general, and then existing methods for the improvement of the strength and heat resistance of glass. The practical strength of glasses is effected by several factors, which have to be considered separately, i. e.: 1) the characteristic high brittleness; 2) the non-oriented and heterogeneous structure, and 3) the formation of defects on the glass surface during production and use. Various authors demonstrated that the brittle rupture of glass occurs in two stages (first slow, second quick) caused by the formation of fissures forming so-called "steps" of brittle rupture. In a series of investigations there was proved the existence of a micro-heterogeneous

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S/063/61/006/006/004/006

A057/A126

The problem of increasing strength and...

structure of glasses, which is mainly influenced by the chemical nature and the conditions of thermal treatment ("thermal past") of the glass. This effect is discussed in the paper by G. G. Sentyurin (this Journal, v. 6, no. 6, 1961, 643). The structural micro-heterogeneity is specified by the type of structural links and the chain skeleton of the glass. Heterogeneities in glasses can also be effected by technological processes; defects in the glass surface are of great importance. Also characteristic for glasses is the definite effect of the scale factor on strength and thermal stability. Observations made by N. K. Dertev [Ref. 39: Some mechanical properties of glass surface layer, Dissertation, Institut khimii silikatov AN SSSR (Institute of Silicate Chemistry AS USSR), L., 1952] revealed that this effect varies with the chemical composition of the glass, proving thus conclusions on the influence of the chemical composition on type and degree of structural micro-heterogeneities and surface defects. The present authors suggest the following trends for the improvement of glass properties: 1) Further improvement of the nature of the glass, 2) strengthening of the surface of industrial glasses, and 3) development of new technological principles and methods for the manufacture of tough and heat resistant industrial glasses. Evidently the influence of the chemical composition can be developed in some cases directly, in others indirectly, and

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The problem of increasing strength and...

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S/06:/61/006/006/004/006  
A057/A126

sometimes it is covered by the effect of other factors. Investigations of the present authors [Ref. 49: Trudy MKhTI im. D. I. Mendeleyeva, v. 27, 1959] showed, for instance, a definite effect of the chemical composition of the glass on its microhardness. The possibility of improving the strength and heat resistance of glass by changing the chemical composition is also proved by results obtained by I. I. Kitaygorodskiy et al. [Ref. 49: Trudy MKhTI im. D. I. Mendeleyeva, v. 27, 1959; Ref. 51: Steklo i keramika, no. 7 (1958); Ref. 53: DAN SSSR, 118, no. 2 (1958)], S. K. Dubrovo, and Yu. A. Shmidt [Ref. 50: ZhPKh, 30, no. 4 (1957)], I. D. Tykachinskiy et al. [Ref. 52: Steklo i keramika, no. 6 (1956)], K. T. Bondarev et al. [Ref. 54: ibid no. 4 (1960)], and M. A. Matveyev, and I. N. Semenov [Ref. 55: ibid no. 9 (1958)] with chemical laboratory glasses of the type KC-16 (KS-16), KC-18 (KS-18), glass with increased microhardness, glass for tubes and insulators type 13-B (13-v) and other special glasses. For the strengthening of the glass surface some original methods were developed by S. M. Brekhovskikh [Ref. 56: Steklo i keramika, no. 7 (1960); Ref. 57: Steklo, Byulleten' in-ta stekla, no. 1 (1961)] and S. I. Sil'vestrovich, and I. A. Boguslovskiy [Ref. 58: DAN SSSR, 129, no. 6 (1959), Steklo i keramika, no. 1 (1960)]. Most developed are at present thermal, chemical, and thermo-chemical methods of glass surface strengthening. A method of thermochemical treatment of the glass surface with silico-organic compounds was

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A057/A126

The problem of increasing strength and...

developed at the kafedra tekhnologii stekla i stekloplastikov MFTI im. D. I. Mendeleeva (Department of Technology for Glass and Glassreinforced Plastics "Moscow Order of Lenin" Institute of Chemical Technology imeni D. I. Mendeleev). This method was also used by I. A. Boguslavskiy [Ref. 69: Steklo i keramika, no. 9 (1960)] to increase the heat resistance of industrial glass. There are 71 references: 48 Soviet-bloc and 23 non-Soviet-bloc. The references to the 4 most recent English-language publications read as follows: W. Thomas, Phys. a. Chem. Glasses (U. K.), 1960; I. Warshaw, J. Am. Ceram. Soc., 1960; R. Mould, J. Am. Ceram. Soc., 1960; F. Einsberger, Phys. a. Chem. Glasses, no. 1 (1960).

Card 4/4

TROSTYANSKAYA, Ye.B.; SHISHKIN, V.A.; SIL'VESTROVICH, S.I.; PANTELEYEV, A.S.; POLUBOYARINOV, D.N.; BALKEVICH, V.L.; NATANSON, A.K.; KOLACHEV, B.A.; PETROV, D.A.; GOL'DBERG, M.M.; SHAROV, M.Ya., inzh., retsenzent; KITAYGORODSKIY, I.I., doktor tekhn. nauk, prof., retsenzent; LIVANOV, V.A., kand. tekhn. nauk, prof., retsenzent; TROSTYANSKAYA, Ye.B., red.; BABUSHKINA, S., ved. red.; TITSKAYA, B.F., ved. red.; VORONOVA, V.V., tekhn. red.

[New kinds of materials in engineering and industry] Novye materialy v tekhnike. Pod red. Trostianskoi E.B., Kolacheva, B.A., Sil'vestrovicha S.I. Moskva, Gostoptekhzdat, 1962.  
656 p. (MIRA 16:2)

(Materials)

SIL'VESTROVICH, S.I.; RABINOVICH, E.M.

Glass crystallization in the system  $\text{SiO}_2 - \text{Al}_2\text{O}_3 - \text{MgO} - \text{R}_2\text{O}$   
in the presence of additives. Trudy MKHTI no. 37:75-84 '62.  
(MIRA 16:12)



BEREZHNOY, A.I.; BRODSKIY, Yu.A.; BRONSHTEYN, Z.I.; VEINBERG, K.L.;  
GALDINA, N.M.; GLETHAN, B.A.; GINZBURG, L.B.; GUTOP, V.G.;  
GUREVICH, L.R.; DAUVAL'TER, A.E.; YEGOROVA, L.S.; KOTLYAR,  
A.Ye.; KUZYAK, V.A.; MAKAROV, A.V.; FOLLYAK, V.V.; POPOVA,  
E.M.; PLYANISHNIKOV, V.F.; Sentyurin, G.G.; SIL'VESTROVICH,  
S.I., kand. tekhn. nauk, dots.; SOLOMIN, N.V.; TEMKIN, B.S.;  
TYKACHINSKIY, I.D.; SHIGAYEVA, V.F.; SHLAIN, I.B.; EL'KIND,  
G.A. [deceased]; KITAYGORODSKIY, I.I., zasl. deyatel' nauki i  
tekhniki RSFSR, doktor tekhn. nauk, prof., red.; GOMOZOVA,  
N.A., red. izd-va; KOMAROVSKAYA, L.A., tekhn. red.

[Handbook on glass manufacture] Spravochnik po proizvodstvu  
stekla. [By] A.I. Berezhnoi i dr. Pod red. I.I. Kitaigorodskogo  
i S.I. Sil'vestrovicha. Moskva, Gostroiizdat. Vol. 2. 1963.  
815 p. (MIRA 16:12)

(Glass manufacture)

L 13964-65 EWP(e)/EPA(s)-2/EWT(m)/EPF(n)-2/EWP(t)/EWP(b) Pq-l/Pt-10/Pu-l  
ESD(gs)/ESD(t) JD/WM/JO/WH

ACCESSION NR: AP4046372

S/0020/64/158/003/0582/0585

AUTHOR: Kitaygorodskiy, I. I.; Sil'vestrovich, S. I.; Firsov, V. M. <sup>B</sup>

TITLE: Strengthening of glass by hardening in molten metal <sup>f</sup>

SOURCE: AN SSSR. Doklady\*, v. 158, no. 3, 1964, 582-585

TOPIC TAGS: glass heat treatment, glass hardening, molten metal treatment, glass strengthening, sheet glass, Pyrex glass

ABSTRACT: A new, more efficient method of strengthening glasses having varied thermal expansion coefficients has been developed and investigated. The method consists in heat treating (hardening) glass in low-melting molten metals such as wood alloy or tin and then leaching it with hydrofluoric acid. Data from bending tests indicated that glasses with high or low coefficients of thermal expansion (common sheet glass and 3C-5K or Pyrex, respectively) can be greatly strengthened by the new method. An especially high increase in strength was achieved in thin (1.3-mm) sheet glass and in the heat-resistant glasses, as compared to the heat treatment with the most

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efficient liquid polyorganosiloxane. Data on comparative degrees of hardening for Pyrex glass indicated a much higher strengthening effect for the treatment with wood alloy than with the liquid polyorganosiloxane. This fact is explained by the intense and uniform cooling of glass in molten metal. Such cooling is achieved because of the high thermal conductivity and very high boiling point of the metals, which make possible a high-temperature (50—1000C) treatment resulting in limitation of thermoelastic strain in glass products. The possibility of achieving even higher strength in glasses having important practical applications (Pyrex, common thin glass) is mentioned. Orig. art. has: 3 figures and 1 table.

ASSOCIATION: Moskovskiy khimiko-tekhnologicheskii institut im. D. I. Mendeleyeva (Moscow Chemical-Technical Institute)

SUBMITTED: 24Apr64

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NO REF SOV: 012

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SOURCE: Ref. zh. Khimiya. Sv. t., Abs. 2480

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AUTHOR: Kitaygorodskiy, I. I.; Sil'vestrovich, S. I.; Firsov, V. M.

TITLE: A study of the strength of glasses quenched in liquid polyorganosiloxanes

CITED SOURCE: Tr. Mosk. khim.-tekhnol. in-ta im. D. I. Mendeleyeva, vyp. 45, 1964, 145-153

TOPIC TAGS: glass strength, glass quenching, glass hardening, quenching fluid, polyorganosiloxane, polyethylhydrosiloxane, laboratory glass, electrovacuum glass

TRANSLATION: This article presents the results of the first stage of a study on the strengthening of industrial chemical laboratory glasses (KS-34 and Ts-32) and electrovacuum glasses (ED-1 and ZS-5K) the compositions of which are given, by quenching them in polyorganosiloxane (liquids No. 2, 4 and 5) and polyethylhydrosiloxane (liquid GKZh-94) liquids which differ in their nature, properties and cooling capacities. The degree of hardening of the glass samples (rods with a circular cross section) was determined by means of a special polarimeter as the rods were illuminated in a direction perpendicular to their longitudinal axis.

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The results showed that it is possible to strengthen various glasses, differing in composition and properties, quite appreciably by quenching them in liquid polyorganosiloxanes; the effects of the thermal conditions of the quenching process and the peculiarities of the chemical composition of the glass on the nature and effect of its strengthening are elucidated. Bibliography with 12 references. I. Mikhaylova

SUB CODE: MT, OC

ENCL: 00

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SIL'VESTROVICH, I.I.; PLODIN, V.M.; G. ABRAMOV, A.V.

Change in the structural and physical state of glass hardened in molten metal. Dokl. AN SSSR 162 no.3:552-555 My '65. (MIRA 18:5)

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Submitted December 11, 1964.

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BOOK EXPLOITATION

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Akademiya nauk SSSR. Institut geografii

Division of the territory of the U.S.S.R. into districts according to basic erosion factors (Rayonirovaniye territorii SSSR po osnovnym faktoram erozii) Ed. by D. L. Armand. Moscow, Izd-vo "Nauka", 1965. 233 p. illus., biblio. 1500 copies printed.

TOPIC TAGS: soil science, underground water, erosion, geographical regionalization

12,55

PURPOSE AND COVERAGE: This book was compiled by staff members of the Institute of Geography, Academy of Sciences USSR, under the direction of S. I. Sil'vestrov. It deals with the regionalization of the USSR on the basis of the main factors of soil erosion. The most important principle in regionalization was the determination, characterization, and evaluation of the geographic conditions in connection with the process of erosion and the countermeasures. Therefore, the regionally defined units (phytoclimate zones, low-land and mountainous provinces, agricultural regions) made it

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possible to classify the territory consistently, not only on the basis of the forms of erosion, but also by the type of necessary antierosion measures. The book is intended for scientific workers and specialists in agriculture, forestry, and water management, as well as for teachers and students in these fields. There are 133 references, all Soviet.

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Comparative evaluation of the effect of basic factors on erosion.  
S. I. Sil'vestrov -- 58

Characterization of regions by basic natural and economic conditions.  
Ye. N. Lisichek, Ye. A. Mironov, S. I. Sil'vestrov, and N. M.  
Stupina -- 88 55 55

<sup>55</sup>  
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SUB CODE: ES

SUBMITTED: 17Apr65

NO REF SOV: 135

OTHER: 000

Card 3/3



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SIL'VINSKAYA, E. A.

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